

July 16, 2004

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Dr. C. W. Jameson  
National Toxicology Program  
Report on Carcinogens  
Bldg. 4401, Rm. 3118  
79 T. W. Alexander Drive  
P.O. Box 12233  
Research Triangle Park, NC 27709

**Re: Comments on the talc nominations for the 12<sup>th</sup> RoC**

Dear Dr. Jameson:

Luzenac America appreciates the opportunity to comment on the talc nominations for the 12<sup>th</sup> RoC review.

**Executive Summary**

Luzenac America sharply objects to the talc nomination of "Occupational exposure to talc" on the basis that the NIEHS rationale for nomination, "*Human epidemiological studies reporting an increase [sic] risk of cancer among workers exposed to talc,*"<sup>1</sup> is unsupported by the literature. In reviewing talc for possible listing in the 10<sup>th</sup> RoC, a review of the occupational exposure literature led to the following conclusions in the talc Background Document (BD):

*"In the light of these findings, the evidence from studies of occupational exposure to non-asbestos-containing talc is not sufficient to support a conclusion that this form of talc is carcinogenic."*<sup>2</sup>

*"The current data indicate that inhaled non-asbestiform talc is unlikely to pose a cancer risk to humans under exposure conditions that do not impair clearance mechanisms or cause chronic lung toxicity."*<sup>3</sup>

These conclusions in the BD are further supported by results in two recently published studies by Wild *et al.* (2002) and Coggiola *et al.* (2003) of European talc miners and millers (see complete citations and summaries in *Comments*). The analysis of French, Austrian, and Italian talc workers constitutes the largest study groups exposed to talc not containing asbestos and the largest data record base in the world. Both studies concluded that there is no significant excess of lung cancer or excess of any other type of cancer amongst these populations. Similarly, pleural or peritoneal mesothelioma, known to be related to asbestos mineral exposure, was not found.

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<sup>1</sup> 69 FR 28940, 28944, May 19, 2004

<sup>2</sup> at 29.

<sup>3</sup> at 71-72.

Clearly, the nomination of “Occupational exposure to talc” is unwarranted and we assert that the nomination must be withdrawn.

Luzenac also protests the nomination category of “Cosmetic talc” on the basis that it fails to provide a clear and specific definition of the substance.

- (1) The nomination category does not utilize the scientific definition as reflected by the CAS Registry number and definition for talc that precludes the presence of asbestos.
- (2) The nomination does not reference the commercial definition of talc used in cosmetic products as promulgated by the Cosmetic, Toiletry and Fragrance Association (CTFA) which also precludes the presence of asbestos.
- (3) The nomination category is overly broad and would be understood by the layperson to encompass all cosmetic products containing talc, when in fact, it appears that the intent of the Agency is to focus only on a potential increased risk of ovarian cancer among women utilizing body powder products in a particular manner.

Clarification of this nomination category is absolutely essential in order to allow for an accurate, scientific review of the literature to purge studies not based upon a “*clear definition of the agent or agents involved in human exposures.*”<sup>4</sup>

## Comments

Luzenac America is a leading producer of high quality talc products and we presently account for over 50% of the talc mined and milled in the United States. All the talc products sold by Luzenac are asbestos-free<sup>5</sup> and contain less than 1% crystalline silica. Naturally, the National Toxicology Program’s (NTP) nominations for the 12<sup>th</sup> RoC listing of “talc” in the form of “Occupational exposure to talc” and “Cosmetic talc” are of great concern to Luzenac and the talc industry worldwide. As such, Luzenac submits to NTP the following objections to these talc nominations in order to allow NTP the opportunity to withdraw or amend the nominations and re-evaluate their merit for formal consideration.

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<sup>4</sup> NTP website – Rational for talc deferral decision: “The NTP decided to defer consideration of listing talc in the 10th RoC and a careful review of the literature on these materials is underway to determine if a *clear definition of the agent or agents involved in human exposures* can be developed.” (emphasis added)

<sup>5</sup> Luzenac America Product Statement: “Luzenac talc does not contain asbestos as defined by the United States Occupational Safety and Health Administration (OSHA), the European Directive 83/477/EEC, and the American Congress of Governmental Industrial Hygienists (ACGIH) when analyzed by X-ray Diffraction, Polarized Light Microscopy, or Transmission Electron Microscopy. This statement is based upon verification by certified, independent laboratories.” This certification is provided to our customers.

The nomination for review of “Occupational exposure to talc” is unwarranted given that this exposure issue was thoroughly examined during the 10<sup>th</sup> RoC review on talc. A review of the occupational exposure literature available at that time led to the following conclusion in the talc BD:

*“In the light of these findings, the evidence from studies of occupational exposure to non-asbestos-containing talc is not sufficient to support a conclusion that this form of talc is carcinogenic.”*<sup>6</sup>

*“The current data indicate that inhaled non-asbestiform talc is unlikely to pose a cancer risk to humans under exposure conditions that do not impair clearance mechanisms or cause chronic lung toxicity.”*<sup>7</sup>

Additionally, RG1, RG2, and the Board of Scientific Counselors Subcommittee did not find sufficient evidence to conclude that occupational exposure to “talc not containing asbestos” is carcinogenic. That consensus is further bolstered by the results reported in two recently published studies.

(i) Wild P, Leodolter K, Réfrégier M, Schmidt H, Zidek T, Haidinger G. 2002. **A cohort mortality and nested case-control study of French and Austrian talc workers.** *Occup Environ Med* 59:0-7.

Two historical cohorts were set up comprising all male subjects who had been working continuously for at least 1 year in a series of talc producing companies in France and Austria. The French cohort consisted of those employed at a site in the French Pyrenees and working between 1945 and 1994. The Austrian cohort consisted of the workers employed between 1972 and 1995 in one of four industrial sites in the Austrian Alps. Two nested case-control studies focusing on non-malignant and malignant respiratory diseases were set up to estimate possible dose-response relations with cumulative exposure to talc dust based on an industry specific job exposure matrix..

(ii) Coggiola M, Bosio D, Pira E, Piolatto PG, La Vecchia C, Negri E, Michelazzi M, Bacaloni A. 2003. **An Update of a mortality study of talc miners and millers in Italy.** *Am J Ind Med*; 44 (1) 63-9.

The cohort was comprised of 1,795 men who had worked for at least 1 year in the mine and/or in the factory between 1946 and 1995

Collectively, these investigations represent the largest study groups exposed to talc not containing asbestos and the largest data record base in the world. Both studies conclude that there is no significant excess of lung cancer or excess of any other type of cancer amongst these populations. Similarly, pleural or peritoneal mesothelioma, known to be related to asbestos mineral exposure, was not found.

As there would be no rationale in reviewing “Occupational exposure to talc containing asbestos” given that asbestos is already listed in the RoC as a known human carcinogen, we see no justification for continuing this line of investigation. Given the past health and safety concerns

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<sup>6</sup> *Supra* n.2.

<sup>7</sup> *Supra* n.3.

expressed by our employees and customers concurrent with the 10<sup>th</sup> RoC talc review, we were pleased to reassure them that NTP review groups were unanimous in their opinion that occupational exposure to “talc not containing asbestos” was unlikely to pose a cancer risk. Yet remarkably, less than four years later, we are once again having to counsel with our stakeholders on this very same issue. We believe that it is time for NTP to remove the unwarranted and damaging suspicion surrounding “Occupational exposure to talc” and withdraw the nomination.

Luzenac also protests the nomination category of “Cosmetic talc” on the basis that it fails to provide a clear and specific definition of the substance.

- (1) The nomination category does not utilize the scientific definition as reflected by the CAS Registry number and definition for talc that precludes the presence of asbestos.
- (2) The nomination does not reference the commercial definition of talc used in cosmetic products as promulgated by the CTFA that also precludes the presence of asbestos.
- (3) The nomination category is overly broad and would be understood by the layperson to encompass all cosmetic products containing talc, when in fact it appears that the intent of the Agency is to focus only on a potential increased risk of ovarian cancer among women utilizing body powder products in a particular manner.

Clarification of this nomination category is absolutely essential in order to allow for an accurate, scientific review of the literature to purge studies not based upon a “*clear definition of the agent or agents involved in human exposures*”,<sup>8</sup> and to allow for an objective, scientific review of the talc mineral itself.

The CTFA currently defines talc utilized for cosmetics purposes as follows:

**DEFINITION:** Talc is an essentially white, odorless, fine powder which is ground from naturally occurring rock ore. It consists of a minimum of 90% hydrated magnesium silicate, with the remainder consisting of naturally associated minerals such as calcite, chlorite, dolomite, kaolin, and magnesite, and containing ***no detectable fibrous, asbestos minerals***.<sup>9</sup> (emphasis added)

The CTFA definition of talc utilized for cosmetic purposes (re: “cosmetic talc”) was amended on October 7, 1976 to include the criteria “no detectable fibrous, asbestos minerals.” Additionally, the CTFA cosmetic talc specification was amended to include a specification (“None detected”) and test method (CTFA J4-1) for certifying the absence of asbestos in cosmetic talc.<sup>10</sup> These

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<sup>8</sup> NTP website – Rational for talc deferral decision: “The NTP decided to defer consideration of listing talc in the 10th RoC and a careful review of the literature on these materials is underway to determine if a *clear definition of the agent or agents involved in human exposures* can be developed.” (emphasis added)

<sup>9</sup> CTFA Specification, Talc (no date). Attachment 1a

<sup>10</sup> CTFA Specification, 10-7-76, “Talc Cosmetic”, Attachment 1b.

definitional changes were promulgated as a result of two studies, one in 1968<sup>11</sup> and one in 1976,<sup>12</sup> which reported finding fibrous-like materials and asbestos in some off-the-shelf consumer body powder talc products. In the latter study, half the brands had asbestos ranging from two to 20 percent. *Id.* This occurred at a time when evidence was accumulating concerning the human carcinogenicity of asbestos and thus the findings generated considerable press coverage and public concern.<sup>13, 14</sup> These actions by CTFA and its member companies assured the U.S. Food and Drug Administration and the public at large that exposure to cosmetic talcs (post 1976) would no longer carry the risks associated with exposure to asbestos.

Luzenac also protests the nomination category of “Cosmetic talc” on the basis that it lacks clarity and is misleading to the layperson. Talc is utilized in a multitude of personal care products. This wide diversity of talc usage was acknowledged in the 10<sup>th</sup> RoC talc BD:

*“Talc is used in several types of cosmetic formulations. Solid-matrix formulations include antiperspirants, lipstick, and concealing makeup. Semi-solid-matrix formulations include blushes, eyeshadows, pressed finishing powders, and base powders. Liquid-matrix formulations include cream and liquid makeups, moisturizing creams, and lotions. Loose-matrix products include foot, body, and baby powders, where talc is used to carry fragrances (Zazenski et al. 1995). Current databases indicate that about 2,000 products containing talc, in some 45 different cosmetic product categories, were voluntarily registered with the U.S. Food and Drug Administration (FDA). Categories of cosmetic products that contain talc include baby products (baby lotions, oils, powders, and creams), generic powders, blushers, face powders and foundations, men’s talcum products, and foot powders (Gilbertson 1995).”*<sup>15</sup>

A potential listing of “Cosmetic talc” by the Agency based upon the NIEHS nomination rational of “*Human epidemiological studies reporting an increased risk of ovarian cancer among women using talc for personal use*”<sup>16</sup> would unreasonably preclude the use of talc in all cosmetic products. Additionally, such a listing would generate health concerns amongst the general public regarding lifetime exposures to all cosmetic products which contained talc.

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<sup>11</sup> Cralley LJ, Key MM, Groth DH, Lainhart WS, and Ligo RM. 1968. Fibrous and mineral content of cosmetic talcum products. *Am Ind Hyg Assoc J* 29 (4): 350-54.

<sup>12</sup> Rohl AN, Langer AM, Selikoff IJ, Tordini A, Klimentidis R, Bowes DR, and Skinner DL. 1976. Consumer talcums and powders: Mineral and chemical characterization. *J Toxicol Environ Health* 2 (2): 255-84.

<sup>13</sup> Washington Post, March 8, 1976, “Asbestos Fibers Found in Baby Powder”, Attachment 2.

<sup>14</sup> New York Times, March 10, 1976, “Asbestos Found in Ten Powders”, Attachment 3.

<sup>15</sup> at 10.

<sup>16</sup> 69 FR 28940, 28944, May 19, 2004

Clarification of this nomination category is absolutely essential in order to allow for an accurate, scientific review of the literature to purge studies not based on a “*clear definition of the agent or agents involved in human exposure.*”

We bring to the attention of NTP two recently published papers which specifically address the issue of the carcinogenic potential (lack thereof) of cosmetic talc.

- (i) Huncharek, M, Geschwind, J.F., and Kupelnick, B. 2003. **Perineal application of cosmetic talc and risk of invasive epithelial ovarian cancer: a meta-analysis of 11,933 subjects from sixteen observational studies.** *Anticancer Research* 23: 1955-60.

A meta-analysis of epidemiology studies of perineal application of talc and ovarian cancer was published in 2003. The analysis included sixteen observational studies and concluded that the “available observational data do not support the existence of a causal relationship between perineal talc exposure and an increased risk of epithelial ovarian cancer. Selection bias and uncontrolled confounding may account for the positive associations seen in prior epidemiological studies.”

- (ii) Wehner AP. 2002. **Cosmetic talc should not be listed as a carcinogen: Comments on NTP’s deliberations to list talc as a carcinogen.** *Reg Tox Pharm* 36:40-50.

Talc is not genotoxic, is not carcinogenic when injected into ovaries of rats, does not cause cancer decades after pleurodesis, and induces apoptosis *in vitro* in human mesothelioma cells but not in normal mesothelial cells. There is no credible evidence of a cancer risk from inhalation of cosmetic talc by humans. Considering talc a carcinogen lacks convincing scientific documentation.

## Background Information

The following information is provided to NTP in the event another Background Document is deemed necessary:

Talc Identification  
Production and Mining  
Occupational Exposure  
Asbestos Association – An Historical Perspective  
Recommended Topics for Review

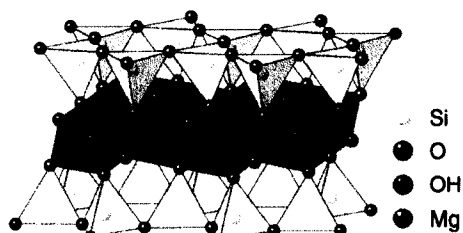
## Talc Identification

Talc (CAS Registry Number 14807-96-6) has a specific mineralogical definition with some commercial distinctions.

**Mineralogically**, talc is a hydrated magnesium sheet silicate with the chemical formula  $Mg_3 Si_4 O_{10} (OH)_2$ . Its elementary sheet is composed of a layer of magnesium-oxygen/hydroxyl octahedra, sandwiched between two layers of silicon-oxygen tetrahedra. The main or basal surfaces of this elementary sheet do not contain hydroxyl groups or active ions, which explains talc's hydrophobicity and inertness. Talc is practically insoluble in water and in weak acids and alkalis.<sup>17</sup>

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<sup>17</sup> Luzenac website “Luzenac.com.” All About Talc.



*Talc crystalline structure Id.*

**Commercially**, talc products include “industrial” grades and “cosmetic” grades.

Industrial grade talc products can vary considerably in actual talc content, from below 50% up to and including 99+% talc. The non-talc components of industrial talc products typically include dolomite ( $\text{MgCa} \cdot 2\text{CO}_3$ ), calcite ( $\text{CaCO}_3$ ), magnesite ( $\text{MgCO}_3$ ), chlorite ( $3\text{MgO} \cdot 4\text{SiO}_2 \cdot \text{H}_2\text{O}$ ), quartz ( $\text{SiO}_2$ ), and occasionally serpentines and amphiboles. Product specifications for industrial talc products are application oriented and are generally established by market and customer requirements. Specifications typically establish parameters for particle size and whiteness. Since the mid-1970’s there has been an ever increasing demand for supplier “certifications” that the talc is asbestos-free.<sup>18</sup> In recent years, these customer requests for certifications have been expanded to include that the talc not contain detectable levels of crystalline silica (<0.1%).

Talc specifications for cosmetic applications are issued by the CTFA. The CTFA specification focuses on the purity of the talc. Additional product parameters are generally specified by the customer. The CTFA talc specification includes the requirement that the product does not contain asbestos. Talc utilized in cosmetic and personal care products normally contain greater than 90% talc and most present-day consumer products contain 96-99+% talc.

## Production and Mining

For 2003, the United States Geological Survey (USGS) estimates domestic talc production of approximately 900,000 short tons (STN) and an apparent consumption of talc at just under 1,000,000 STN.<sup>19</sup> USGS estimates that industrial talc usage (paint, paper, ceramic, plastics, etc.) accounted for over 97% of this consumption with cosmetic usage at less than 3%. *Id.*

In mineralogical terms, Luzenac estimates that the approximate 1,000,000 STN domestic talc market can be classified into three general categories:

High purity talc (95–99+% mineral talc)	650 - 700,000 STN
Talc/carbonate (60-85% mineral talc)	200 - 250,000 STN
Tremolitic talc (20-35% mineral talc)	100 - 120,000 STN

The “high purity talc” is produced by beneficiating talc ore that contains other naturally occurring non-talc minerals (e.g., carbonates). The beneficiation process may include hand-

<sup>18</sup> See footnote 5, *supra*.

<sup>19</sup> U.S. Geological Survey, Mineral Commodity Summaries, January 2004. Talc and Pyrophyllite. At 164.

sorting, mechanical sorting, or froth flotation.<sup>20</sup> The “talc/carbonate” and “tremolitic talc” products are produced from talc ore that receive minimal beneficiation.

Talc mines located in Montana, Vermont, Texas, and New York accounted for virtually all of the domestic production. All of the mines are surface, open-pit operations.



*The soft talc rock is easily extracted with hydraulic shovels from open pit mining operations. If high purity talc products are required, the ore is beneficiated.<sup>21</sup>*

### **Occupational Exposure**

According to the USGS, approximately 500 U.S. workers were engaged in talc mining and milling in 2003, producing approximately 900,000 STN of product. This is down from almost 700 workers in 1999 when approximately 1,000,000 STN were produced. *Id.*

According to the National Occupational Exposure Survey conducted from 1980 to 1983, approximately 19,000 workers were potentially exposed to talc.<sup>22</sup> However, due to the age of the survey, substantial productivity gains, advancements in product handling, and a determined industrial and regulatory effort to reduce airborne dust exposure in the workplace, Luzenac estimates that a current exposure survey would likely yield an exposure number less than half of the survey figure conducted over 20 years ago. For a historical perspective, talc consumption in 1982 was approximately 850,000 STN.<sup>23</sup>

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<sup>20</sup> Zazenski R, Ashton WH, Briggs D, Chudkowski M, Kelse JW, MacEachern L, McCarthy EF, Nordhauser MA, Roddy MT, and Teetsel NM. 1995. Talc: occurrence, characterization, and consumer applications. *Regul Toxicol Pharmacol* 21:218-29.

<sup>21</sup> See footnote 17, *supra*.

<sup>22</sup> U.S.EPA. 1992. Health Assessment Document for Talc. EPA 600/8-91/217 Research Triangle Park, NC, Environmental Criteria and Assessment Office, U.S. Environmental Protection Agency.

<sup>23</sup> Luzenac internal report. 1993. *North American Talc Demand Forecast*. Prepared by Kline and Company.



## Asbestos Association – An Historical Perspective

The ongoing, incorrect perception by many that talc contains asbestos does have an historical basis in fact. Prior to the time when evidence was accumulating concerning the human carcinogenicity of asbestos, many commercial types of talc mined around the world did contain one or more of the six minerals eventually regulated as asbestos.<sup>24</sup> These minerals were natural contaminants in the talc deposits.

In 1972, the regulatory and commercial landscape for talc began a protracted change when OSHA published its first regulations concerning worker exposure to asbestos.<sup>25</sup> The regulations defined asbestos as being one of the six minerals, chrysotile, crocidolite, amosite, actinolite, tremolite, and anthophyllite. These regulations were eventually revised in 1992<sup>26</sup> to properly distinguish the natural asbestos forms (re: “asbestiform”) of actinolite, tremolite, and anthophyllite from the non-carcinogenic, non-asbestiform varieties of these same minerals.<sup>27</sup>

In 1976, body and baby powders containing talc became the focus of attention when a published study reportedly found asbestos in ten of 19 body and baby powders. Responding to concerns from both the public as well as regulators the CTFA amended their definition of cosmetic talc to include the criteria “no detectable fibrous, asbestos minerals.” Additionally, the CTFA cosmetic talc specification was modified to include a specification (“None detected”) and a newly developed test method (CTFA J4-1) for certifying the absence of asbestos in cosmetic talc.

As concerns over the potential health effects of asbestos began to emerge, various agencies and organizations found it necessary to distinguish the category of talc “*not containing asbestos*” from talc “*containing asbestos*.” Presently, this talc differentiation is incorporated into regulations, recommendations, reports, health summaries, and specifications published by the following organizations:

- American Congress of Governmental Industrial Hygienists (ACGIH)
- National Institute of Occupational Safety and Health (NIOSH)
- Occupational Safety and Health Administration (OSHA)
- International Agency for Research on Cancer (IARC)
- Cosmetic, Toiletry, and Fragrance Association (CTFA)
- Food Chemical Codex (FCC)
- California Safe Drinking Water and Toxic Enforcement Act of 1986 (Prop 65)
- International Programme on Chemical Safety (IPCS)
- International Labour Organization (ILO)
- International Chemical Safety Cards (WHO/IPCS/ILO)

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<sup>24</sup> IARC. 1987a. *Talc*. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. 42: 185-224 Lyon, France, International Agency for Research on Cancer

<sup>25</sup> FR 37:11318

<sup>26</sup> FR 57:24310

<sup>27</sup> Zazenski RJ. 1998. The commercial significance of talc. *Comments Toxicol, Special Issue on Talc* 6(5):313-26

**Table 1. Summary of published specifications for talc “containing” and “not containing asbestos.”**

Organization	Specification	Remarks
ACGIH	<p>Talc containing no asbestos fibers – TLV-TWA, 2 mg/m<sup>3</sup>, Respirable particulate fraction.</p> <p>*****</p> <p>Talc containing asbestos fibers – TLV-TWA, Use asbestos TLV; however, should not exceed 2 mg/m<sup>3</sup>, respirable particulate fraction</p>	<p>A4 – Not Classifiable as a Human Carcinogen</p> <p>“Evidence is ample that the dust or particulate of non-fibrous talc, consisting almost entirely of platiform talc crystals and containing no asbestos, carries a relatively small respiratory hazard for exposed workers.”</p> <p>*****</p> <p>A1 –Confirmed Human Carcinogen.</p>
NIOSH	Talc (containing no asbestos and less than 1% quartz) - TWA 2 mg/m <sup>3</sup> (respirable dust)	Symptoms: Fibrotic pneumoconiosis; irritation eyes
OSHA	<p><u>TABLE Z-1 LIMITS FOR AIR CONTAMINANTS</u> Talc (containing asbestos): use asbestos limit: see 29 CFR 1910.1001 Talc (containing no asbestos), respirable dust: see Table Z-3 ***** <u>TABLE Z-3 MINERAL DUSTS</u> Talc (not containing asbestos): 20 mppcf Talc (containing asbestos) Use asbestos limit.</p>	It should be noted that OSHA proposed adopting the ACGIH TLV of 2mg/m <sup>3</sup> in the 1989 Final Rule on Air Contaminants (54FR2332 et. seq.). The U.S. Circuit Court of Appeals remanded this rule and the limits are not currently in force.
IARC	<p>Talc not containing asbestiform fibres is not classifiable as to its carcinogenicity to humans (Group 3). *****</p> <p>Talc containing asbestiform fibres is carcinogenic to humans (Group 1).</p>	
CTFA	Specification: Fibrous Amphibole (Asbestiform Tremolite et al) – “None detected”	Talc Definition: “Talc is...and containing no detectable fibrous, asbestos minerals.”
FCC	Talc derived from deposits that are known to contain associated asbestiform minerals is not food grade.	
Prop 65	CHEMICALS KNOWN TO THE STATE TO CAUSE CANCER OR REPRODUCTIVE TOXICITY: Talc containing asbestiform fibers.	Listed April 1, 1990

<b>IPCS</b>	Talc (Silica and Fibre Free) – TLV: 2 mg/m <sup>3</sup> as TWA	The substance may have effects on the lungs, resulting in talc pneumoconiosis.
<b>ILO</b>	Talc (Silica and Fibre Free) – TLV: 2 mg/m <sup>3</sup> as TWA	The substance may have effects on the lungs, resulting in talc pneumoconiosis.
<b>WHO IPCS ILO</b>	Talc (Silica and Fibre Free) – TLV: 2 mg/m <sup>3</sup> as TWA	The substance may have effects on the lungs, resulting in talc pneumoconiosis.

### Recommended Topics for Review

In the event the preparation of another talc Background Document is deemed necessary, Luzenac recommends that it include reviews of talc pleurodesis and “system distribution.”

#### ***Talc Pleurodesis***

During the 10<sup>th</sup> RoC review of talc, it was noted by several commenters that the talc BD did not sufficiently address the issue of talc pleurodesis for the treatment of pneumothorax and pleural effusion. Pleurodesis provides a human model for studying direct injection of the pleura with talc and should be included in a comprehensive evaluation of talc pathology. One such study is cited here, but a more thorough literature search and evaluation by knowledgeable experts should be considered for this specific subject.

Research Committee of the British Thoracic Association and the Medical Research Council Pneumoconiosis Unit. 1979. **A survey of the long-term effects of talc and kaolin pleurodesis.** *Br J Dis Chest* 73:285-88.

In a study specifically devised because of the suggestion that talc might be carcinogenic, the authors surveyed 199 of 210 patients who underwent pleurodesis with iodized talc or kaolin 14 to 40 years previously, and found there was no increase in incidence of lung cancer, and no occurrence of mesotheliomas. 92 of the 210 were treated with talc. Kaolin was included due to its chemical similarity to talc and its propensity for producing pulmonary fibrosis with prolonged and heavy exposure (though no carcinogenic effects had been observed).

#### ***Systemic Distribution***

In reviewing the issues of deposition, clearance, and retention of talc not containing asbestos, the 10<sup>th</sup> RoC talc BD concluded:

*“Ingested or inhaled non-asbestiform talc particles are unlikely to be absorbed into the systemic circulation and distributed to other parts of the body.”*<sup>28</sup>

<sup>28</sup> at 71-72.

This conclusion was surprising, and we think in error, given that the BD cited references of Henderson *et al.* (1975),<sup>29</sup> Pratt *et al.* (1985)<sup>30</sup> and Werebe *et al.* (1999).<sup>31</sup> We believe a more comprehensive study of the literature on systemic distribution demonstrates a distinct possibility that non-toxic particulates of low-solubility (e.g. talc) can be introduced into the circulatory system by inhalation and ingestion, which in turn can result in systemic distribution with minimal clinical significance. This mechanism offers a plausible explanation for finding microscopic, birefringent particulates deeply embedded in ovarian tumors as well in normal ovarian tissue (removed from breast cancer patients).<sup>32</sup> It also offers a credible explanation for finding talc in 100% of the controls (unexposed) in the findings of Heller *et al.*<sup>33</sup> Given that talc is widely used in food (chewing gum, candy), OTC drugs (antacids), and pharmaceuticals (excipient, tableting, coatings),<sup>34</sup> ingestion by consumers is more frequent and widespread than may be apparent if the focus is only on exposure to talc utilized in cosmetic products. The potential for inhalation of ultrafine airborne talc particulates can be stipulated for applications of consumer body and baby powders.

A sampling of some of the studies not reviewed by NTP is presented herein, but a more thorough literature search and evaluation by knowledgeable experts should be considered for this specific issue.

(i) Abraham JL. 1979. **Documentation of environmental particulate exposures in humans using SEM and EDXA.** *Scan Electron Microsc.* (2):751-66

(ii) Lee KP, Trochimowicz HJ, Reinhardt CF. 1985. **Transmigration of titanium dioxide (TiO<sub>2</sub>) particles in rats after inhalation exposure.** *Exp Mol Pathol.* Jun;42(3):331-43.

(iii) Kringsholm B, Christoffersen P. 1987. **The nature and the occurrence of birefringent material in different organs in fatal drug addiction.** *Forensic Sci Int* May-Jun;34(1-2):53-62.

(iv) Anani PA, Ribaux C, Gardiol D. 1987. **Unusual intestinal talcosis.** *Am J Surg Pathol* Nov;11(11):890-4.

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<sup>29</sup> Henderson WJ, Evans DM, Davies JD, and Griffiths K. 1975. Analysis of particles in stomach tumours from Japanese males. *Environ Res* 9:240-249.

<sup>30</sup> Pratt PC, George MH, Mastin JP, Roggli VL. 1985. Crystalline foreign particulate material in hernia sacs. *Hum Pathol* Nov;16(11):1141-6.

<sup>31</sup> Werebe E, Campos et al. 1999. Systemic distribution of talc after intrapleural administration in rats. *Chest Jan.* Vol. 115, No. 1, pp. 190-193.

<sup>32</sup> Henderson WJ, Joslin CA, Turnbull AC, and Griffiths K. 1971. Talc and carcinoma of the ovary and cervix. *J Obstet Gynecol Br Commonw* 78:226-272.

<sup>33</sup> Heller DS, Westhoff C, Gordon RE, and Katz N. 1996a. The relationship between perineal cosmetic talc usage and ovarian talc particle burden. *Am J Obstet Gynecol* 174:1507-10.

<sup>34</sup> See footnote 20, *supra*.

(v) Takenaka S, Karg E, Roth C, Schulz H, Ziesenis A, Heinzmann U, Schramel P, Heyder J 2001. **Pulmonary and systemic distribution of inhaled ultrafine silver particles in rats.** *En Health Perspect.* Aug;109 Suppl 4:547-51

(vi) Oberdorster G. 2001. **Pulmonary effects of inhaled ultrafine particles.** *Int Arch Occup Environ Health.* Jan;74(1):1-9

In conclusion:

1. The nomination of "Occupational exposure to talc" is unwarranted and we assert that the nomination be withdrawn.
2. The nomination category of "Cosmetic talc" is seriously flawed because it fails to provide a clear and specific definition of the substance. Additionally, it is overly broad and is misleading to the layperson.
3. Should it be deemed necessary to prepare another talc Background Document, we recommend it should incorporate reviews of talc pleurodesis and systemic distribution.

We regard these issues and recommendations of great consequence and trust they will receive careful attention.

Respectfully,



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Attachments

**ATTACHMENTS 1a, 1b, 2, and 3.**

**TOTAL 4 PAGES**

July 15, 2004

Dr. C. W. Jameson

Re: Comments on the talc nominations for the 12<sup>th</sup> RoC

ATTACHMENT 1a

C.T.F.A Specification

## TALC

**DEFINITION:** Talc is an essentially white, odorless, fine powder which is ground from naturally occurring rock ore. It consists of a minimum of 90% hydrated magnesium silicate, with the remainder consisting of naturally associated minerals such as calcite, chlorite, dolomite, kaolin, and magnesite, and containing no detectable fibrous, asbestos minerals.

TEST	SPECIFICATION	METHOD
Color .....	As specified by the buyer and showing no change after heating	Heat 1 to 2 g at 200°C for 5 minutes.
Odor .....	As specified by the buyer	
Identification .....	1. Close match to CTFA spectrum-IR with no indication of foreign materials or 2. (Alternate) Close match to X-ray Powder Diffraction File No. 19-770, published by ASTM, showing the most intense reflections at d values about 9.35, 1.53, and 4.95°A	CTFA G 3-1
Slip .....	As specified by the buyer	
Lustre .....	As specified by the buyer	
Water-Soluble Iron .....	Passes test	USP (Current)
Water-Soluble Substances ....	0.1% maximum	USP (Current) (Reaction and Soluble Substances)
Acid-Soluble Substances ....	As specified by the buyer 6.0% maximum	CTFA E 32-1
Screen Test .....	100% through 100 mesh 98% minimum through 200 mesh Finer grades; as specified by the buyer	CTFA C 6-1
Loss on Ignition .....	6.0% maximum	CTFA E 36-1
Arsenic (as As) .....	3 ppm maximum	CTFA E 1-1, Parts I-A and II
Lead (as Pb) .....	20 ppm maximum	CTFA E 2-2, Parts I-A and II
Fibrous Amphibole (Asbestiform Tremolite et al.) ..	None detected	CTFA J 4-1
Free Crystalline Silica (Quartz) .	As specified by the buyer	CTFA J 5-1 (DTA) Alternate: CTFA J 6-1 (X-ray)
*****		

July 15, 2004

Dr. C. W. Jameson

Re: Comments on the talc nominations for the 12<sup>th</sup> RoC

ATTACHMENT 1b

TALC COSMETIC

Issued: 8-1-82

Revised: 3-23-82

5-22-77

10-7-76



CTFA Adopted Name:  
TALC

## COSMETIC TALC

**DEFINITION:** Cosmetic Talc is an essentially white, odorless, fine powder, ground from naturally occurring rock ore. It consists typically of 90% hydrated magnesium silicate, having the ideal formula  $Mg_3(Si_2O_5)_2(OH)_2$ , with the remainder consisting of naturally associated minerals such as calcite, chlorite, dolomite, kaolin and magnesite, and containing no detectable fibrous, asbestos minerals.

TEST	SPECIFICATION	METHOD
Color .....	As specified by the buyer and showing no change after heating	Heat 1 to 2 g at 200°C for 5 minutes
Odor .....	As specified by the buyer	
Identification .....	Positive: 1. Close match to CTFA Spectrum—IR with no indication of foreign materials OR 2. (Alternate) Close match to X-ray Powder Diffraction File No. 19-770, published by ASTM, showing the most intense reflections at d values about 9.35, 1.53 and 4.59 Å	CTFA G 3-1  ASTM D 934-74
Slip .....	As specified by the buyer	
Lustre .....	Do.	
Water-Soluble Iron .....	Passes test	USP XIX, page 487
Screen Test .....	100% through 100 mesh 98% minimum through 200 mesh Finer grades: as specified by the buyer	CTFA C 6-1
Water Soluble Substances .....	0.1% maximum	USP XIX, page 487 See test for "Reaction and Soluble Substances"
Acid Soluble Substances .....	As specified by the buyer 6.0% maximum	CTFA E 32-1
Loss of Ignition .....	5.0% maximum	USP XIX, page 487
Arsenic (as As) .....	3 ppm maximum	CTFA F 1-1, Parts I-A and II
Lead (as Pb) .....	20 ppm maximum	CTFA F 2-1, Parts I-A and II
Fibrous Amphibole .....	None detected	CTFA J 4-1
(Asbestiform Tremolite et al)		
Free Crystalline Silica .....	As specified by the buyer	CTFA J 5-1 (DTA) Alternate: CTFA J 6-1 (X-ray)
(Quartz)		



July 15, 2004

Dr. C. W. Jameson

Re: Comments on the talc nominations for the 12<sup>th</sup> RoC

ATTACHMENT 2

THE WASHINGTON POST Monday, March 2, 1976

# Asbestos Fibers Found in Baby Powder

By Marian Burros

Washington Post Staff Writer

Asbestos fibers, which are found in thousands of products from food to building insulation, have been discovered in nine of 19 body and baby powders studied by researchers at Mt. Sinai Hospital in New York.

Asbestos can cause mesothelioma, a rare form of chest and abdominal cancer, and asbestosis, scarring of lung tissue. In 1972 Dr. William J. Nicholson of Mt. Sinai reported that these diseases caused nearly 40 per cent of the deaths of New York-New Jersey asbestos workers.

Dr. Irving J. Selikoff of Mt. Sinai, a leading expert on occupational disease, said, "We do not know a safe threshold level for a carcinogen like asbestos." Once asbestos fibers enter the body, he said, they stay there.

Researchers at Mt. Sinai's Department of Environmental Medicine tested one sample each of 19 body and baby powders. Arthur M. Langer, head of the physical sciences section of the department, said nine samples contained asbestos fibers in quantities ranging from "2 to 20 per cent."

The powders with the greatest concentration of asbestos fibers, ranging from 8 to 20 per cent, were ZBT Baby Powder with baby oil, Cashmere Bouquet Body Talc, Coty Airspun Face Powder and Rosemary Talc.

Bauer & Black Baby Talc, which is no longer on the market, had a 15 per cent concentration of asbestos fibers, the researchers found.

Smaller amounts of asbestos fibers—under 5 per cent—were found in Faberge Brut Talc, Yardley Invisible Talc, Yardley Black Label Body Powder, Mennen Shave Talc and English Leather After Shave Talc.

Officials of Colgate Palmolive, which makes Cashmere Bouquet, Sterling Drugs, Inc., manufacturer of ZBT Baby Powder and of Coty said they are certain their products are safe. They said no asbestos had been found in their testing.

The manufacturer of Rosemary Talc could not be reached for comment.

The other powders studied were Ammen's Medicated Powder; Avon Bird of Paradise Beauty Dust; Diaperene Medicated Body Powder; Johnson's Baby Powders, one made in England and one in the United States; Johnson's Medicated Powder; Mennen Bath Talc; Yardley After Shave Powder and Yardley Original Body Powder. None of them contained asbestos. One, Diaperene, contained no talc. It is made of cornstarch.

The Food and Drug Administration said in 1972 it would propose regulations to govern the use of asbestos-contaminated talc in cosmetics. The director of FDA's division of cosmetics technology, Heinz J. Eirmann, said recently the agency had not issued regulations because it had not found a "fast method" for determining the presence of asbestos at low levels. The sophisticated method used at Mt. Sinai, electron microscopy, he said, was too time consuming and expensive.

The Mt. Sinai researchers, who have conducted the study under a grant from the National Institute of Environmental Health Services since 1973, also investigated the powders for the presence of other metallic elements, including nickel.

With the exception of Rosemary Talc and Diaperene which contained no nickel, 16 of the powders contained from 4 to 710 parts per million (ppm) of nickel. A sample of Johnson's Baby Powder contained 2,200 ppm.

Surprised at what they regarded as a high nickel con-

tent of the powder, the researchers purchased seven more samples. Five of them had 1,800 ppm or more of nickel; two had fewer than 710 ppm. Langer said researchers "don't know if the nickel is hazardous at high levels."

Dr. F. William Sunderman, Jr., head of the department of laboratory medicine at the University of Connecticut and an expert on nickel, said: "We're trying to find out which nickel compounds do cause cancer and which don't. Certain nickel compounds are carcinogenic when inhaled; others are not."

Johnson & Johnson's associate director for public affairs, Robert Kniffin, said the nickel in the talc is "harmless" because "it is biologically inert" and won't react with body tissues.

A study revealed last September by Dr. J. C. Wagner of the Pneumoconiosis Research Unit at Penarth, Wales, raised the question about the safety of talc itself, the major ingredient in powders. Wagner found that asbestos-free talc caused fibrosis, lung scarring in the test animals "at the same rate as asbestos."

Epidemiological studies have shown that talc workers develop talcosis, another form of lung scarring, from exposure to large amounts of the mineral.

According to Selikoff, the amount of talc that must be inhaled to cause tissue scarring or cancer in humans is not known.

July 15, 2004

Dr. C. W. Jameson

Re: Comments on the talc nominations for the 12<sup>th</sup> RoC

ATTACHMENT 3

The New York Times Wednesday March 10, 1976

## Asbestos Found In Ten Powders

Ten out of 19 body and baby powders tested at Mount Sinai Hospital here were contaminated with asbestos fibers capable of causing a rare form of chest and abdominal cancer, researchers have reported.

Dr. Arthur Rohl, who conducted the tests with Dr. Arthur Langer, said of the findings: "There is no firm evidence on low-level or intermittent exposure, such as from using talcum powder. We don't know for sure what the danger level is."

The researchers said the contamination usually was found in the talc used in the powders. Asbestos fibers can cause mesothelioma, a chest and abdominal cancer, and can also result in the scarring of lung tissue and gastro-intestinal difficulties, Dr. Rohl said.

The researchers said that 10 of the 19 American samples contained from 2 percent to 20 percent asbestos fibers with the highest concentration in ZBT Baby Powder with Baby Oil. Cashmere Bouquet Body Talc, Coty Airspun Face Powder and Rosemary Talc range from 8 percent to 20 percent asbestos fibers.

Bauer & Black Baby Talc, which is no longer on the market, had a 15 percent concentration. Other powders containing less than 5 percent asbestos were Fabergé Brut Talc, Yardley Invisible Talc, Yardley Black Label Baby Powder, Mennen Shave Talc and English Leather After Shave Talc.

The manufacturers that could be reached for comment said that they were convinced that their products were safe and that their own tests had shown no asbestos. Only the manufacturer of Rosemary could not be reached.

The products that the researchers found uncontaminated with asbestos fibers were Ammen's Medicated Powder, Avon Bird of Paradise Beauty Dust, Diaperene Medicated Body Powder, two Johnson's Baby Powders (one made here and one in Britain), Johnson's Medicated Powder, Mennen Bath Talc, Yardley After Shave Powder and Yardley Original Body Powder.

The tests at Mt. Sinai, which Federal health officials described as the country's leading research facility looking into the possible dangers of asbestos, used an electron microscope, which Heinz J. Eirmann, director of cosmetics technology in the Food and Drug Administration, said was too expensive and time-consuming for his agency to use.

The experiments at Mt. Sinai, which Dr. Rohl described as the only significant inquiry on the subject ever held, were financed by a grant from the National Institute of Environmental Health Services and were begun in 1973.